***** CONFIDENTIAL *****
***** PREDECISIONAL DOCUMENT *****

SUMMARY SCORESHEET FOR COMPUTING

PROPOSED REVISED HRS SCORE

SITE NAME: Oil Operators, Inc.

CITY, COUNTY: Long Beach, Los Angeles

EPA ID #: CAD983566399

PROGRAM ACCOUNT #: FCA1483PAA

EVALUATOR: Toner Mitchell **DATE:** 6/5/90

THIS SCORESHEET IS FOR A PA X SSI _____ LSI _____

PROJECTED PROPOSED REVISED HRS SCORE

	S pathway	S^2 pathway
Air Migration Pathway Score (S_a)	26.56	705.43
Groundwater Migration Pathway Score (S_{gw})	68.25	4658.06
Surface Water Migration Pathway Score (S_{sw})	0	0
On-site Exposure Pathway Score (S_{os})	100.00	10,000.00
$S^2_a + S^2_{gw} + S^2_{sw} + S^2_{os}$		15,363.49
$(S^2_a + S^2_{gw} + S^2_{sw} + S^2_{os})/4$		3,840.87
$\sqrt{(S^2_a + S^2_{gw} + S^2_{sw} + S^2_{os})/4}$		61.97

AIR MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors

	Likelihood of Release	Maximum Value	Projected Score	Ref.	Conf.
1.	Observed Release	450	0	1	E
2.	Potential to Release* (Highest value assigned to any source evaluated)	390	300	2	H
3.	Likelihood of Release (Higher of Lines 1 or 2)	450	300		
	Waste Characteristics				
4.	Toxicity/Mobility	100	100	3	H
5.	Hazardous Waste Quantity	100	75	4	E
6.	Waste Characteristics (Lines 4+5)	200	175		
	Targets				
7.	Maximally Exposed Individual	50	50	5	H
8.	Population*	235	47	6	E
9.	Land Use*	10	10	7	H
10.	Sensitive Environments*	100	0	8	E
11.	Targets (Lines 7+8+9+10, subject to a maximum of 235)	235	107		
	Air Pathway Migration Score				
12.	Pathway Score (S_a) (Lines $3 \times 6 \times 11)/2.115 \times 10^5$	100	26.56**		E

*Use additional tables.
**S_a is not to be rounded to the nearest integer.

AIR PATHWAY CALCULATIONS

2. Potential to Release

Source	Source Type	Source Type Factor Value (Table 2-6)	Source Mobility Factor Value (Table 2-10)	Sum	Source Contain. Value (Tables 2-4,2-5)	Emission Source Value
		(A)	(B)	(A + B)	(C)	(A+B) x C
1.	LAND TREATMENT	70	30	100	3	300
2.	>	>	>	>	>	>
3.	>	>	>	>	>	>
4.	>	>	>	>	>	>

Reference: >

8. Population

Distance Category	Distance (miles)	(A) Population	(B) Distance Weight	(A x B)
1	on-site	0	5.265	
2	> 0 to 1/4	1398	1.0	1398
3	>1/4 to 1/2	4130	0.1751	723
4	>1/2 to 1	9311	0.0517	481
5	> 1 to 2	49128	0.0171	840
6	> 2 to 3	86393	0.0083	717
7	> 3 to 4	93052	0.0054	502

Air target populations = $\frac{\text{(Sum of AxB)}}{100}$ = 47 Sum of (A x B) = 4661

Reference: >

AIR PATHWAY CALCULATIONS (Cont.)

9. Land Use

Land Use	Distance (miles)	(A) Distance Weight (Table 2-16)	(B) Value For Use Type	(A x B)
Commercial/Industrial/ Institutional	.25	1	5	5
Single Family Residential	.5	.1751	8	1
Multiple Family Residential	>	>	10	>
Parks	.25	1	5	5
Prime Agricultural	>	>	7	>
Nonprime Agricultural	>	>	5	>
			Sum of (A x B)	11

Land use factor value = Sum of (A X B) Subject to maximum value of 10 = 11

Reference: >

10. Sensitive Environments

Type of Environment	(A) Assigned Value (Table 2-18)	Distance (miles)	(B) Distance Weight (Table 2-16)	(A x B)
Area used by California Least Tern Sterna Antillarum	50	4	.0054	0
>	>	>	>	>
>	>	>	>	>
>	>	>	>	>
>	>	>	>	>
			Sum of (A x B)	0

Sensitive environment factor value = $\frac{\text{Sum of (A x B)}}{10}$ = $\frac{0}{0}$

Reference: >

tm/oil/rhrs

GROUNDWATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors

	Likelihood of Release	Maximum Value	Projected Score	Ref.	Conf.
1.	Observed Release	500	0	9	E
2.	Potential to Release*				
	2a. Containment	10	10	10	E
	2b. Net Precipitation	10	1	11	E
	2c. Depth to Aquifer/ Hydraulic Conductivity	35	35	12	H
	2d. Sorptive Capacity	5	3	13	H
	2e. Potential to Release (Lines 2ax(2b+2c+2d))	500	390		
3.	Likelihood of Release (Higher of Lines 1 or 2e)	500	390		
	Waste Characteristics				
4.	Toxicity/Mobility	100	100	29	H
5.	Hazardous Waste Quantity	100	75	4	E
6.	Waste Characteristics (Lines 4+5)	200	175		
	Targets				
7.	Maximally Exposed Individual	50	12	14	E
8.	Population*				
	8a. Level I Concentrations	200	-		
	8b. Level II Concentrations	200	-		
	8c. Level III Concentrations	200	-		
	8d. Potential Contamination*	200	200	15	E
	8e. Population (Lines 8a+ 8b+8c+8d, subject to a maximum of 200)	200	200		
9.	Groundwater Use				
	9a. Drinking Water Use	50	30	16	H
	9b. Other Water Use	20	10	17	H
	9c. Groundwater Use (Lines 9a+9b, with a maximum of 50)	50	40		
10.	Wellhead Protection Area	50	0		D
11.	Targets (Lines 7+8e+9c+10, subject to a maximum of 200)	200	200		E

GROUNDWATER MIGRATION PATHWAY SCORESHEET (CONCLUDED)

Factor Categories and Factors

Likelihood of Release	Maximum Value	Projected Score	Ref.	Conf.
12. Aquifer Score [Lines 3x6x11)/2x10^5]**	100	68.25		
Groundwater Migration Pathway Score				
13. Pathway Score (Sgw), (Highest Value from Line 12 for all aquifers evaluated)	100	68.25 **		

* Use additional tables
** These scores are not to be rounded to the nearest integer.

GROUNDWATER PATHWAY CALCULATIONS

2. Potential to Release

Layer Description	(T) Thickness(ft)	(HC) Hydraulic Conductivity (cm/sec)	(SC) Sorptive Capacity	(T/HC)	(TxSC)
ALLUVIAL CLAY, SILT, SAND	67	10^{-2}	15	6700	1005
>	>	>	>	>	>
>	>	>	>	>	>
Sum(T)	67			Sum(T/HC)= 6700	Sum(TxSC) = 1005

Depth to Aquifer/Hydraulic Conductivity = $\frac{\text{Sum(T)}}{\text{Sum(T/HC)}} = 10^{-2}$

Sorptive Capacity = $\frac{\text{Sum(T x SC)}}{100} = 10.05$

Reference: >

8. Population

Actual Contamination

Well Identifier	Contaminant Detected	Concentration	Benchmark	(A) Population	(B) Level* Divisor	(A/B)
>	>	>	>	>	>	>
>	>	>	>	>	>	>
>	>	>	>	>	>	>
				Sum (A/B) Level I		>
				Sum (A/B) Level II		>
				Sum (A/B) Level III		>

* Divisors
- Level I = 1
- Level II = 10
- Level III = 100

Reference: >

tm/oil/rhrs

GROUNDWATER PATHWAY CALCULATIONS (Cont.)

8. **Population**

Potential Contamination

Dilution Weighting Factor (DW)

Distance (miles)	Karst	All Others	(P) Population	(DW x P)
0 to 1/4	1.00	1.00	-	-
>1/4 to 1/2	0.62	0.62	-	-
>1/2 to 1	0.50	0.32	-	-
> 1 to 2	0.50	0.18	100,000	18,000
> 2 to 3	0.50	0.13	400,000	52,000
> 3 to 4	0.50	0.08		
			Sum (DW x P)	70,000

Potential contamination = $\frac{\text{Sum(DW x P)}}{100} = 700$

Reference: >

tm/oil/rhrs

SURFACE WATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Maximum Value	Projected Score	Ref.	Conf.
DRINKING WATER THREAT				
Likelihood of Release				
1. Observed Release	120	0	18	
2. Potential to Release by Overland Flow				
2a. Containment	10	0	19	
2b. Runoff	6	4	20	
2c. Distance to Surface Water	6	6	20	
2d. Potential to Release by Overland Flow (Lines 2ax(2b+2c))	120	0		
3. Potential to Release by Flood				
3a. Containment (Flood)	10		19	
3b. Flood Frequency	12	0	21	D
3c. Potential to Release by flood (Lines 3ax3b)	120	0		
4. Potential to Release (Lines 2d+3c, subject to a maximum of 120)	120	0		
5. Likelihood of Release (Higher of Lines 1 or 4)	120	0		
Waste Characteristics				
6. Toxicity/Persistence	100	100	30	
7. Hazardous Waste Quantity	100	75	4	
8. Waste Characteristics (Lines 6+7)	200	175		
Targets				
9. Maximally Exposed Individual	50	0	22	
10. Population*				
10a. Level I Concentrations	200	-		
10b. Level II Concentrations	200	-		
10c. Level III Concentrations	200	-		
10d. Potential Contamination	200	0		
10e. Population (Lines 10a + 10b+10c+10d, subject to a maximum of 200)	200	0		

SURFACE WATER MIGRATION PATHWAY SCORESHEET (CONTINUED)

Factor Categories and Factors	Maximum Value	Projected Score	Ref.	Conf.
DRINKING WATER THREAT (CONCLUDED)				
Targets (Concluded)				
11. Surface Water				
11a. Drinking Water Use	50	0	22	H
11b. Other Water Use	20	0		
11c. Surface Water Use (Lines 11a+11b)	50	0		
12. Targets (Lines 9+10e+11c, subject to a maximum of 200)	200	0	22	H
Drinking Water Threat Score				
13. Drinking Water Threat (Lines 5x8x12)	4.8×10^6	0		
HUMAN FOOD CHAIN THREAT				
Likelihood of Release				
14. Likelihood of Release (Same Value as Line 5)	120	0		
Waste Characteristics				
15. Toxicity/Persistence	100	100	3	H
16. Hazardous Waste Quantity	100	75	4	E
17. Waste Characteristics (Lines 15+16)	200	175		
Targets				
18. Population*				
18a. Potential Human Food Chain Contamination	200	16	23	E
18b. Actual Human Food Chain Contamination	200	0		
18c. Population (Lines 18a+18b, subject to a maximum of 200)	200	16		
19. Fishery Use	50	50	23	E
20. Targets (Lines 18c+19, subject to a maximum of 200)	200	66		

SURFACE WATER MIGRATION PATHWAY SCORESHEET (CONTINUED)

Factor Categories and Factors	Maximum Value	Projected Score	Ref.	Conf.
HUMAN FOOD CHAIN THREAT (Concluded)				
Human Food Chain Threat Score				
21. Human Food Chain Threat (Lines 14x17x20)	4.8×10^6	0		
ENVIRONMENTAL THREAT				
29. Likelihood of Release (Same Value as Line 5)	120	0		
Waste Characteristics				
30. Ecosystem Toxicity/Persistence	100	90	24	
31. Hazardous Waste Quantity	100	75	4	
32. Waste Characteristics (Lines 30+31)	200	165		
Targets				
33. Sensitive Environments*				
33a. Level I Concentrations	120			
33b. Level II Concentrations	120			
33c. Potential Contamination	120	0	25	
33d. Sensitive Environments subject to a maximum of 120)	120	0		
34. Targets (Value from Line 33)	120	0		
Environmental Threat Score				
35. Environmental Threat (Lines 29x32x34)	2.88×10^6	0		

SURFACE WATER MIGRATION PATHWAY SCORESHEET (CONTINUED)

SURFACE WATER MIGRATION PATHWAY SCORE FOR A WATERSHED

36. Watershed Score [(Lines 13+21+28+35)/48,000 subject to a maximum of 100]	100	0 **	____

SURFACE WATER MIGRATION PATHWAY SCORE

37. Pathway Score (Sgw), (Sum of scores from Line 36 for all watersheds evaluated, subject to a maximum of 100)	100	0 **	____

* Use additional tables.
** These scores are not to be rounded to the nearest integer.

18. Food Chain Targets

Fishery	Production (lb/yr)	Assigned Production Value (Table4-15)	Bioaccumulation Factor Value	(P) Assigned Population Value (Table4-16)	Average Stream Flow at Fishery	(DW) Dilution Weighting Factor (Table4-11)	(PxDW)
San Pedro Bay	549,000	6	(lead) 5	1.6×10^6	ocean	.001	1600
Los Angeles River	0	>	>	>	>	>	>
>	>	>	>	>	>	>	>
>	>	>	>	>	>	>	>
>	>	>	>	>	>	>	>

Sum (P) 1.6×10^6 Sum(PxDW) 1600

For fisheries with Actual Contamination, Food Chain Targets = Sum (P) = >

For fisheries with Potential Contamination, Food Chain Targets = $\frac{\text{Sum(DW xP)}}{100}$ = 16

Reference: >

tm/oil/rhrs

SURFACE WATER CALCULATIONS (Cont.)

Potential Contamination

Sensitive Environment	(A) Assigned Value (Table 2-18 or 2-19)	Average Stream Flow (cfs)	(DW) Dilution Weighting Factor (Table 4-11)	(A x DW)
California Least Tern	75	20,000	.001	.075
>	>	>	>	>
>	>	>	>	>
			Sum of (A x DW)	.075

Potential contamination = $\frac{\text{Sum (A x DW)}}{10}$ = .0075

Reference: >

ON-SITE EXPOSURE PATHWAY SCORESHEET

Factor Categories and Factors

	Maximum Value	Projected Score	Ref.	Conf.
Resident Population Threat				
1. Likelihood of Exposure	100	0	26	H
2. Waste Characteristics	5	0		
3. Targets				
3a. High-Risk Population	100	0		
3b. Total Resident Population	100	0		
3c. Terrestrial Sensitive Environments	25	0		
3d. Targets (Lines 3a+3b+3c, subject to a maximum of 100)	100	0		
4. Resident Population Threat Score (Lines 1x2x3d)	50,000	0		
Nearby Population Threat				
5. Likelihood of Exposure				
5a. Waste Quantity	100	100	31	E
5b. Accessibility Frequency of Use	100	75	27	H
5c. Likelihood of Exposure	100	100		
6. Waste Characteristics	5	5	32	
7. Targets*				
7a. Population Within 1-Mile	100	100	28	E
7b. Targets (Line 7a, subject to a maximum of 100)	100	100		
8. Nearby Population Threat Score (Lines 5cx6x7)	50,000	50,000		
On-site Exposure Pathway Score				
9. On-site Exposure Pathway Score (Sos) (Lines [4+8]/500, to a maximum of 100)	100	100**		

* Use additional table.
**These scores are not to be rounded to the nearest integer.

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ON-SITE EXPOSURE CALCULATIONS

7. Nearby Population Targets

Distance (miles)	(A) Multiplier	(P) Population	(A x P)
0 to 1/4	0.10	1398	139.8
>1/4 to 1/2	0.05	4130	206.5
>1/2 to 1	0.025	9311	232.8
		Sum (A x P)	579.1

Reference: >

SCORESHEET RATIONALE - OIL OPERATORS, INC.

1. Although the illnesses of several nearby schoolchildren and residents coincided with the beginning of the land treatment project, a direct link between the two events has not been established. It should be noted that benzene, ethyl benzene, xylene, and toluene were detected in October 1989 air sampling.

2. Based on land treatment as source type, high particulate mobility for this region high gas mobility of arsenic, and the absence of containment.

3. Toxicity based on lead as a contaminant (5), Versar Tables. Mobility based on Thornthwaite PE Index for this region (3).

4. Since midnight dumping has not been proven at the site, and the petroleum related contaminants are exempt from CERCLA, the source area must be used in calculating waste quantity. The site is 14 acres = 609,840 $ft.^2$/8,100 (land treatment/contaminated soil) = 75.29 as waste quantity.

5. There is an elementary school located less than 500 feet west of the Oil Operators site. U.S. Geological Survey topographic map, Long Beach Quadrangle, 1964.

6. Approximately 243,000 people live within a 4-mile radius of the site. California Department of Finance, "1980 Census of Population and Housing Database," Summary Tape Tape File 1A.

7. The site is in a mixed industrial/residential area of Long Beach. Site Reconnaissance Interview and Observations Report, Toner Mitchell, Ecology and Environment, Inc., Field Investigation Team, May 17, 1990.

8. The California Least Tern (Sterna Antillarum) has been known to frequent coastal areas of Long Beach. This is farther than 4 miles from the site. California Department of Fish and Game, Natural Diversity Database, Long Beach Quadrangle, expires April 1, 1990.

9. Lead (18 mg/l), chromium (5.5 mg/l) and copper (7.3 mg/l) have been detected in perched water beneath the site. However, this is not the aquifer of concern. Jaykim Engineers, Inc., Sample Results, Oil Operators, Inc., May 13, 1988.

10. The north property site is apparently lined with clay. However, the observed release to perched water indicates that containment at the site is inadequate.

11. Net annual precipitation for the Long Beach area is approximately 3 inches. Comparative Climatic Data for the United States through 1985, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Environmental Satellite Data and Information Service, National Climatic Data Center, Nashville, TN.

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SCORESHEET RATIONALE - OIL OPERATORS, INC. (Cont.)

12. Depth to perched groundwater is approximately 8 feet. Underlying geological material consists of alluvial silts, sands, and clay, underlain by gravel and sand to about 1,000 feet. Jack K. Bryant and Associates, Inc., Summary of Boring No. MW-4, Oil Operators, Inc., North Site Date Drilled: June 5, 1989. State of California Department of Water Resources, Bulletin #104, "Planned Utilization of Groundwater Basins of the Coastal Plain of Los Angeles County," Appendix A, Groundwater Geology, June, 1961.

13. Sorptive capacity based on the presence of sand and gravel in underlying zones.

14. The nearest known drinking water well is approximately 1.5 miles west of the site. This well is operated by the City of Dominguez. Terry Witthoft, Dominguez Water Corporation, and Kate Dragolovich, E & E FIT, telephone conversation, August 8, 1989.

15. The Long Beach Water Department operates 28 wells that serve approximately 430,000 Long Beach residents. Flohra, Ron, Long Beach Water Department and Toner Mitchell, E & E FIT, telephone conversation, May 9, 1990.

16. Groundwater is blended with Colorado River water purchased from the Metropolitan Water District to serve Long Beach. Flohra, Ron, Long Beach Water Department, and Toner Mitchell, E & E FIT, telephone conversation, May 9, 1990.

17. Groundwater is used for industrial purposes as well. Same source as 16.

18. No observed release to surface water has been documented.

19. The Los Angeles River is bermed so it is effectively upgradient of the facility. Site Reconnaissance Interview and Observations Report, Dick Young and Wes Williams, Oil Operators, Inc., and Toner Mitchell, E & E FIT, May 17, 1990.

20. Site is within 100 feet of the Los Angeles River. The drainage area is 14 acres. Surface material is sand with little or no vegetation. Same source as 19.

21. Site is in 100-year floodplain, default value.

22. Surface water is not used for drinking. Flohra, Ron, Long Beach Water Department, and Toner Mitchell, E & E FIT. telephone conversation, May 9, 1990.

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SCORESHEET RATIONALE - OIL OPERATORS, INC. (Cont.)

23. Approximately 549,000 pounds of fish are taken out of San Pedro Bay by commercial fishermen each year. California Department of Fish and Game, Marine Resource Division, "Catch Block Data for 1987," derived from Annual 1AA Report, August 31, 1988.

24. Based on Ecosystem toxicity for copper and lead. Versar Tables.

25. Although California Least Tern frequents coastal areas of Long Beach, their habitat is more than 4 miles downstream of the Oil Operators site.

26. There is no resident population. Site Reconnaissance Interview and Observations Report, May 17, 1990.

27. Although fenced on three sides, the site is accessible from the west where a horse/bike riding path exists. Site Reconnaissance Interview and Observations Report, May 17, 1990.

28. Approximately 15,000 people live within one mile of the site. California Department of Finance, "1980 Census of Population and Housing Database," Summary Tape File 1A.

29. Based on toxicity/aquatic mobility for arsenic. Versar Tables.

30. Based on toxicity/persistence for lead. Versar Tables.

31. 560,000 $yds.^3$ x 2,000 $lbs/yds.^3$ = 1,120,000,000 lbs. ÷ 7,407 (QWD) = 151,208 - available to the on-site pathway.

32. Based on overall toxicity for lead. Versar tables.

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